PATENT SPECIFICATION

DRAWINGS ATTACHED

860,026

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COMPLETE SPECIFICATION

Improvements in and relating to Resilient Valves for Fluids Under Pressure

We, REGIE NATIONALE DES USINES RENAULT, a French Body Corporate, of 8–10 Avenue Emile Zola, Billancourt, (Seine), France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

This invention relates to a valve for the passage therethrough of fluid under pressure and relates to an improvement in or modification of the invention disclosed in the specification of our British Patent Application No. 27897/56 (Serial No. 846,271) with particular reference to the embodiment illustrated in figure 7.

According to the present invention there is provided a valve for the passage therethrough of fluid under pressure, said valve including a housing formed with an inlet at one end and an outlet at the opposite end co-axial with the inlet, and a cup-shaped valve member mounted over an axial projection extending from the inlet towards the outlet inside the housing, the rim of said member being fixed relatively to the housing whilst the lower portion of the said member defines a piston-like part which is connected to said rim by a resilient portion through which fluid, when flowing through said inlet and through a channel in said projection, can pass to act on said piston-like part on both sides of said resilient portion, said piston-like part being formed with a shoulder on the outside of said resilient portion to facilitate displacement, against the action of said resilient portion, of the piston-like part under fluid pressure towards the outlet to close off, in cooperation with a perforated flexible diaphragm forming the bottom of said member, vent means formed in said housing providing communication between the outlet and the atmosphere and to enable said fluid to flow along the outer surface of the projection through the perforated diaphragm and through said outlet.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made to the single figure of the accompanying drawing in which a valve embodying the invention is shown in axial section, the right-hand portion of the figure showing the valve in one operative position and the left hand portion of the figure showing the valve in a second operative position.

Referring now to the drawing, the illustrated valve comprises a housing consisting of a part 1 with a nozzle or outlet 2, and a part 3 screwed into the part 1 and formed with an inlet 4, the inlet 4 and the outlet 2 being co-axially arranged in the assembled housing. The part 3 is formed with an integral projection extending axially from the inlet towards the outlet and is formed with a channel opening in the interior of the housing through a plurality of ports 5 only one of which is shown.

Inside the housing, a cup-shaped valve member 12 made of resilient material and in one piece is mounted over the projection. This cup-shaped valve member includes a rim 14 in the form of a toroidal beading which is wedged between a bead 23 on the projection of the part 3 and the wall of the part 1 so as to fix the rim relatively to the housing and to act as a seal against leakage between the parts 1 and 3 of the housing. The lower portion of the valve member 12 defines a piston-like part 15 which is connected to the rim 14 by a circular series of spaced lamellae 16, numbering four for example, which enable fluid under pressure flowing through the ports 5 into the housing to act on the piston-like part of the valve member 12 on both sides of the lamellae 16. The piston-like part is provided with a circumferential shoulder 26 on the outside of the lamellae 16. This shoulder serves to facilitate displacement, against the tensile action of the lamellae 16 of the piston-like part towards the outlet 2. The piston-like part is guided along the wall of the casing part 1 by an annular bead 17 and by an arrangement of annular lips which engage said wall and prevent the flow

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of fluid therealong.

The piston-like part is also guided along the projection of the housing part 3 by a series of axially extending spaced ribs 23' which, moreover, enable fluid under pressure from the inlet 4 to flow along the interstices 25 therebetween towards the outlet 2. It will be noted that the bead 23 and the ribs 23' define therebetween a neck 22 facilitating extension of the lamellae 16 by the reduction of friction against the projection of the housing part 3. The bottom of the cup-shaped valve member 12 is formed by a diaphragm which decreases in thickness towards the centre at which is formed an opening 21.

The housing part 1 is also formed with vent means comprising an annular groove 7 around the outlet 2 and communicating with the atmosphere by means of radial ports (only one of which is shown). These ports are covered by the lip 11 of a sleeve 9 which is fixed relatively to the housing by means of a bead 10 lodged in an annular recess formed in the housing part 1. The sleeve 9 is shaped in such a manner as to have a certain resilient tension once it is in position on the housing part 1 (see the position in dotted lines in the figure.

The operation of the device is as follows :

Fluid under pressure reaches the valve through the inlet 4, and the outlet 2 of the housing is connected to the admission of pneumatic apparatus next to which the valve is placed.

When the control valve of the pneumatic apparatus delivers fluid under pressure to the inlet 4, the fluid enters the interior of the housing 1 through the ports 5 and exerts a pressure on the upper face of the piston-like part 15 of the valve member 12, thus urging said piston-like part 15 towards the bottom of the valve body 1. As the pressure continues to be exerted, the bead 17 and another bead 18 straddle the annular groove 7 and the lip 19 of the diaphragm bends outwards (see the right-hand portion of the figure) about a circular groove acting as a hinge, thus enlarging the openning 21 which allows the fluid to flow through the outlet 2. It will be seen that in this position, the groove 7 and the exhaust ports 8 are effectively sealed by the beads 17 and 18 as well as by a bead 24 on the bottom of the valve body 1.

When the control valve for the pneumatic apparatus is closed, the pressure of the fluid contained inside the valve housing drops and the piston-like part 15 of the resilient valve member 12 is restored back to the position shown at the left-hand portion of the figure by the resilient tension of the lamellae 16. Simultaneously the openning 21 contracts and the lip 19 of the diaphragm is urged back against a conical seating at the free end of the projection of the housing part 3 to form a seal. The compressed gases in the outlet 2 can then escape to the atmosphere through the groove 7 and the ports 8, raising the lip 11 of the outer sleeve 9.

WHAT WE CLAIM IS:—

1. A valve for the passage therethrough of fluid under pressure, said valve including a housing formed with an inlet at one end and an outlet at the opposite end co-axial with the inlet, and a cup shaped valve member mounted over an axial projection extending from the inlet towards the outlet inside the housing, the rim of said member being fixed relatively to the housing whilst the lower portion of the said member defines a piston-like part which is connected to said rim by a resilient portion through which fluid, when flowing through said inlet and through a channel in said projection, can pass to act on said piston-like part on both sides of said resilient portion, said piston-like part being formed with a shoulder on the outside of said resilient portion to facilitate displacement, against the action of said resilient portion, of the piston-like part under fluid pressure towards the outlet to close off, in cooperation with a perforated flexible diaphragm forming the bottom of said member, vent means formed in said housing providing communication between the outlet and the atmosphere and to enable said fluid to flow along the outer surface of the projection through the perforated diaphragm and through said outlet.

2. A valve as claimed in claim 1, wherein the resilient portion of said valve member consists of a circular series of spaced extendible lamellae.

3. A valve as claimed in claim 1 or 2, wherein said vent means is covered by the lip of a resilient sleeve extending around said housing, which lip can open to allow fluid under pressure to escape from said outlet when said valve member is freed from fluid pressure from said inlet.

4. A valve as claimed in any preceding claim, wherein said diaphragm, when said inlet is freed from fluid pressure bears against the adjacent end of said projection to prevent the return of fluid from said outlet to said inlet.

5. A valve as claimed in any preceding claim, wherein the rim of said valve member is formed by an annular beading serving as a fixing member.

6. A valve substantially as hereinbefore described with reference to the accompanying drawing.

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860,026 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.